IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION	)	
	)	
Plaintiff,	)	C.A. No. 06-738 (SLR)
	)	
v.	)	**REDACTED - PUBLIC VERSION**
	)	
HEWLETT-PACKARD COMPANY,	)	
	)	
Defendant.	)	

APPENDIX TO POLAROID CORPORATION'S OPENING BRIEF IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT UNDER 35 U.S.C. § 287

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TAB A

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION Plaintiff, v. HEWLETT-PACKARD COMPANY, Defendant.	C.A. No. 06-738 JURY TRIAL DEMANDED

COMPLAINT

Plaintiff Polaroid Corporation ("Polaroid"), brings this action against Defendant Hewlett-Packard Company ("HP"), alleging as follows:

The Parties

1. Polaroid is a Delaware corporation having a principal place of business at 1265 Main Street - Building W3, Waltham, MA 02451.

2. HP is a Delaware corporation having a principal place of business at 3000 Hanover Street, Palo Alto, California 94304. HP makes, uses, offers for sale, sells, and/or imports printers, scanners, and digital cameras that employ Adaptive Lighting Technology (a.k.a. Digital Flash in some HP Photosmart camera menus) in the U.S. HP also makes, uses, offers for sale, sells, and/or imports consumables (e.g., ink and paper) and software for these printers, scanners, and digital cameras in the U.S.

Jurisdiction and Venue

3. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338, as this action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*

4. This Court has personal jurisdiction over HP because HP is a resident of Delaware, having incorporated in this state. In addition, HP has sufficient contacts with Delaware such that compelling it to appear and defend in the forum does not offend traditional notions of fair play and substantial justice.

5. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b) and 1400(b). HP has long-standing and substantial contacts with the State of Delaware both generally and specifically in connection with the accused printers, scanners, digital cameras, and software.

CLAIM FOR RELIEF

(Patent Infringement, 35 U.S.C. §271)

6. Polaroid incorporates by reference, as if set forth in full herein, paragraphs 1 through 5 above.

7. Polaroid owns United States Patent No. 4,829,381, titled "System and Method for Electronic Image Enhancement by Dynamic Pixel Transformation," issued May 9, 1989 ("the '381 patent"). The '381 patent describes a system and method for continuously enhancing electronic images composed of pixels by varying the contrast in different portions of the image. A true and correct copy of the '381 patent is attached hereto as Exhibit A.

8. Woo-Jin Song and Donald S. Levinstone are the inventors of the '381 patent. Prior to issuance of the '381 patent, they assigned all rights, title, and interest in and to the '381 patent to Polaroid. Thus, Polaroid owns all right, title and interest in and to the '381 patent, with the right to recover damages for all past, present, and future infringement of the '381 patent.

9. HP makes, uses in the U.S., offers for sale in the U.S., sells in the U.S., and/or imports into the U.S. products with Adaptive Lighting Technology.

10. HP also makes, uses in the U.S., offers for sale in the U.S., sells in the U.S., and/or imports into the U.S. software with Adaptive Lighting Technology.

11. By making, using, offering for sale, selling, and/or importing products and software with Adaptive Lighting Technology, HP infringes the '381 patent under 35 U.S.C. §271(a).

12. By making, using, offering for sale, selling, and/or importing products and software with Adaptive Lighting Technology, HP also induces infringement of the '381 patent under 35 U.S.C. §271(b).

13. HP asked Polaroid for a license to certain, unidentified Polaroid patents.

14. Upon information and belief, one of the patents that HP wanted to license from Polaroid was the '381 patent.

15. Polaroid notified HP of Polaroid's belief that the '381 patent should be included in a license agreement with HP.

16. But, HP did not then, nor has it since, taken a license to the '381 patent. Instead, HP has engaged in its infringing conduct. HP's infringement is therefore willful and deliberate.

17. As a direct and proximate result of HP's acts of patent infringement, Polaroid has been and continues to be injured and has sustained, and will continue to sustain, substantial damages in an amount not yet determined.

18. In addition, Polaroid has and will continue to suffer irreparable harm as a direct and proximate result of HP's acts of patent infringement.

19. HP's willful infringement of the '381 patent makes this an exceptional case under 35 U.S.C. § 285.

Requested Relief

WHEREFORE, Polaroid prays that this Court enter judgment:

a. Finding that HP has infringed and/or induced others to infringe the '381 patent under 35 U.S.C. § 271.

b. Finding that HP's infringement is willful and deliberate.

c. Enjoining HP and its subsidiaries, agents, officers and employees, and all others acting in concert with them, from infringing and inducing infringement of the '381 patent.

d. Ordering HP to pay Polaroid an amount that adequately compensates Polaroid for HP's infringement, no less than a reasonable royalty.

e. Ordering HP to pay court costs, pre-judgment interest, post-judgment interest and attorney's fees under 35 U.S.C. §§ 284 and 285.

f. Increasing damages found or assessed due to HP's willful infringement.

g. Ordering an accounting and audit of HP's sales of infringing products and software not before the jury.

h. Granting Polaroid such other and further relief as is just and proper.

Demand for Jury Trial

Polaroid hereby demands a jury trial on all claims and issues triable of right by a jury.

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December 5, 2006
548111

EXHIBIT A

United States Patent [19]

Song et al.

[11] Patent Number: 4,829,381

[45] Date of Patent: May 9, 1989

[54] SYSTEM AND METHOD FOR ELECTRONIC IMAGE ENHANCEMENT BY DYNAMIC PIXEL TRANSFORMATION

[75] Inventors: Woo-Jin Song, Waltham; Donald S. Levinstone, Lexington, both of Mass.

[73] Assignee: Polaroid Corporation, Cambridge, Mass.

[21] Appl. No.: 182,987

[22] Filed: Apr. 18, 1988

[51] Int. Cl.[4] H04N 5/235; H04N 5/208

[52] U.S. Cl. 358/168; 358/166; 358/32; 358/164

[58] Field of Search 358/166, 167, 36, 37, 358/168, 169, 32, 164

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Primary Examiner—James J. Groody
Assistant Examiner—E. Anne Faris
Attorney, Agent, or Firm—Edward S. Roman

[57] ABSTRACT

A system and method are provided for continuously enhancing electronic image data received in a continuous stream of electronic information signals wherein the electronic information signal corresponding to each pixel of the image recorded is selectively transformed as a function of the average value of electronic information signals for a select plurality of pixel values in the immediate area of the pixel value being transformed. The electronic information signal transformations are provided on a pixel-by-pixel basis to increase contrast in localized areas that may be either exceptionally light or dark as a result of varying scene lighting conditions.

13 Claims, 2 Drawing Sheets

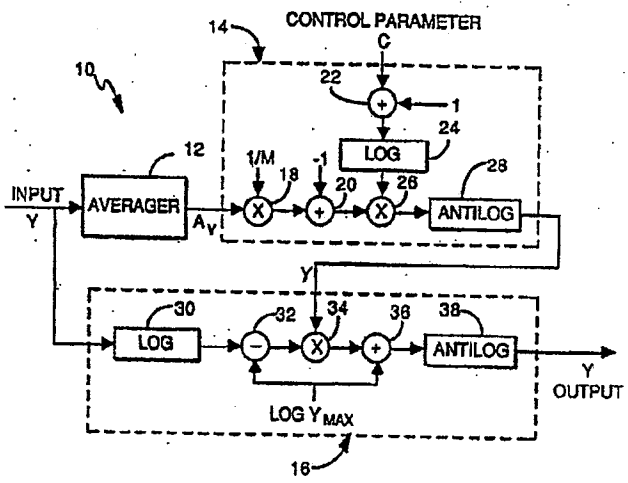
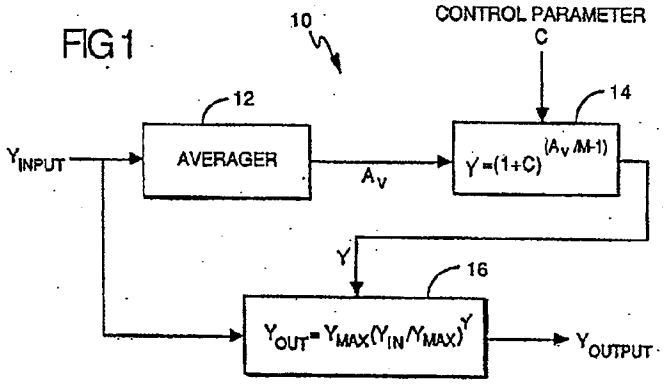


FIG 1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Y_{OUTPUT}

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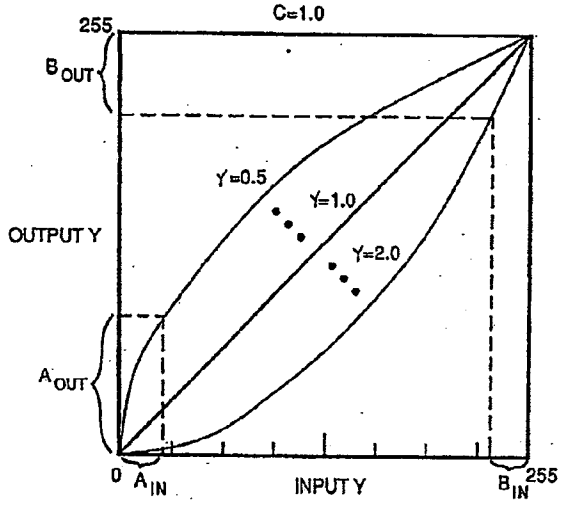
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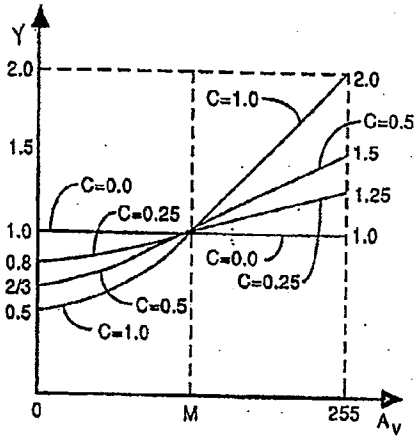
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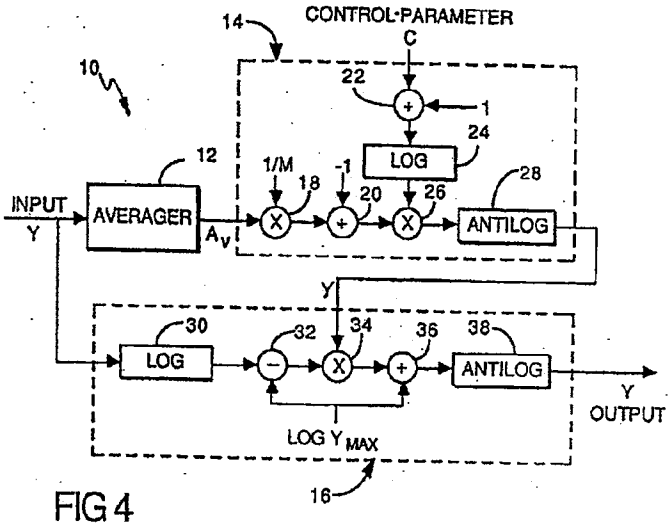
FIG 3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10
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1
24
LOG
12
1/M
18
-1
20
26
28
INPUT
Y
AVERAGER
A_V
ANTILOG
Y
30
32
34
36
38
LOG
ANTILOG
Y
OUTPUT
LOG Y_{MAX}
16

FIG 4

SYSTEM AND METHOD FOR ELECTRONIC IMAGE ENHANCEMENT BY DYNAMIC PIXEL TRANSFORMATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a system and method for electronic image enhancement by dynamic pixel transformation and, more particularly, to a system and method for enhancing electronic image information by dynamically transforming electronic information signals on a pixel-to-pixel basis.

2. Description of the Prior Art

Electronic still image cameras are becoming well known in the art. Such cameras utilize photoresponsive arrays to sense scene light and convert the sensed scene light into electronic information signals. Electronic information signals are thereafter stored on a suitable media which may include magnetic, optical or solid state storage for subsequent retrieval and viewing. It may be desirable at some point to transform the stored image defining electronic information signals to a hard copy of the scene originally recorded. Photographic media have been suggested and used for such purposes. Difficulties arise, however, as a result of differences between the wide dynamic range of the scene originally sensed and recorded and the substantially smaller dynamic range to which a photographic print may be exposed. The wide dynamic range of luminance intensities within the scene originally recorded may thus be compressed or clipped to the substantially smaller dynamic range of the photographic print, losing detail within certain portions of the dynamic range that were otherwise visible in the original scene. Thus, it may be desirable to transform the original image defining electronic information signals in a nonlinear manner to selectively increase and/or decrease the contrast and brightness in certain portions of the scene such as those that might be brightly lit by sunlight or underlit as a result of shadows. However, no single transform function can be uniformly applied to all the image defining electronic information signals of the scene and achieve satisfying results because the lighting conditions vary across the scene.

Therefore, it is an object of this invention to provide a system and method of electronically enhancing images by dynamically increasing or decreasing contrast and brightness in selected portions of the scene that may be overlit or underlit.

It is a further object of this invention to provide a system and method of enhancing image defining electronic information signals in a dynamic manner on a pixel-by-pixel basis such that the value of each pixel is selectively transformed as a function of the average value of a plurality of pixels closely spaced about that pixel.

Other objects of the invention will be in part obvious and will in part appear hereinafter. The invention accordingly comprises a mechanism and system possessing the construction, combination of elements and arrangement of parts which are exemplified in the following detailed disclosure.

SUMMARY OF THE INVENTION

A system is provided for enhancing electronic image data received in a continuous stream of electronic information signals wherein each signal corresponds to one of a plurality of succeeding pixels. The pixels collectively define the image to be recorded. Means are provided for averaging the electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each of the plurality of the pixels so averaged. Means operate to thereafter select one of the plurality of different transfer functions of electronic information signals for each of the succeeding pixels. Each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing that one pixel. The electronic information signal corresponding to each pixel is subsequently transformed by the transfer function selected for that pixel. The system responds to an average electronic information signal indicative of low scene light intensity levels by transforming electronic information signals to provide a higher contrast and/or brightness to those electronic information signals corresponding to pixels having the lowest scene light intensity levels. The system also responds to an average electronic information signal indicative of high scene light intensity levels by transforming electronic information signals to provide a higher contrast and/or lower brightness to those electronic information signals corresponding to pixels having the highest scene light intensity levels.

DESCRIPTION OF THE DRAWINGS

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with other objects and advantages thereof will be best understood from the following description of the illustrated embodiment when read in connection with the accompanying drawings wherein:

FIG. 1 is a block diagram showing the system for enhancing electronic image data in the manner of this invention;

FIG. 2 is a graphical representation showing the output electronic information signals versus the input electronic information signals;

FIG. 3 is a graphical representation showing the variation of gamma γ with different selected control parameters; and

FIG. 4 is a block diagram showing in substantially more detail a system for enhancing electronic image data of this invention in the manner of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In electronic image processing it is desirable to adjust the image contrast automatically to produce more detail in both the bright and dark areas of a scene that is recorded. The image enhancing system and method of this invention operates to both lighten the dark regions of a scene and darken the light regions of a scene by enhancing contrast to improve the detail visibility that would otherwise be lost when the electronic image signals are converted to a hard copy reproduction. Toward that end, the system and method of this invention operates to continuously enhance electronic image data received in a continuous stream of electronic information signals, each signal of which corresponds to one of the plurality of succeeding pixels which collectively define the recorded image.

Referring now to FIG. 1, there is shown a block diagram for the system of this invention in which a continuous stream of electronic information signals each corresponding to one of a plurality of succeeding pixels from the recorded image are received at terminal Y_{input}. The electronic information signals input at terminal Y_{input} may be derived in a well-known manner by a two-dimensional photosensitive array or sensor (not shown) which may comprise a high resolution charge coupled device (CCD) or charge injection device (CID). The sensor receives image scene light in any well-known manner by way of an objective lens and shutter (also not shown). The image sensing array comprises a plurality of image sensing elements or pixels preferably arranged in a two-dimensional area array wherein each image sensing pixel converts the incident image defining scene light rays into a corresponding analog electronic information signal value. Preferably, the image sensing pixels are arranged in columns and rows as is well known in the art. As will be readily understood, image sensing arrays, particularly for sensing still images, preferably comprise a large number of image sensing elements or pixels in the order of 500,000 or greater.

The two-dimensional photosensitive arrays may also be overlayed with any one of a variety of different well-known filter patterns so that each pixel provides an electronic information signal value corresponding to a particular color. For instance, the columns of the two-dimensional photosensitive array may be overlayed with any one of a red, green or blue filter stripe arranged in a repeating fashion across the face thereof. The electronic information signal value for each pixel in this arrangement thus corresponds to a particular color.

The electronic information signal values retrieved from the photosensitive array in this manner are preferably converted to luminance (Y) and chrominance, e.g., (R-Y and B-Y) signal values. For the case where the two-dimensional photosensitive array is overlayed with red, green and blue filters, the luminance electronic information signals are preferably determined by the following relationship: $Y=0.30R+0.59G+0.11B$ as is well known in the television art. The analog luminance electronic information signal values for each pixel element of the photosensitive array for the example herein described are digitized to an 8-bit binary number so as to have a dynamic integer range of from 0 - 255 within which range are 256 intensity levels and a maximum luminance value of $Y_{MAX}=255$. The electronic image detection and processing herein described so far will be recognized as being conventional and well known in the art.

The image defining electronic information signals derived in the above-described manner and preferably comprising digitized luminance signals are thereafter subjected to a gain control function which may be automatic as is well known in the art before being directed to input terminal Y_{input} of the block diagram of FIG. 1. The image defining luminance electronic information signals are thereafter averaged for selected pluralities of pixels by an averager 12. The averager 12 may comprise a low pass filter as is well known in the art which operates to provide an average value electronic information signal Av corresponding to the average luminance values for a selected window or plurality of pixels that continuously changes in correspondence with each succeeding pixel value to be enhanced. Alternatively, the averager may comprise a block average in which a selected group or block of pixel values is averaged to provide one average value electronic information signal Av in correspondence with each pixel value of that group to be enhanced. Succeeding groups of pixel values are thereafter averaged. In the preferred mode, the selected groups of pixels are preferably selected in two dimensions from the photosensitive array.

Both low pass filtering and block averaging require a buffer memory to hold the selected groupings of pixel values for averaging as is well known in the art. The low pass filter method results in a continuing change in the average value of the electronic information signal Av for each succeeding pixel thereby providing a more accurate determination of average values for selecting the appropriate transfer function in the manner of this invention to be described. However, as will be well understood, the low pass filtering technique requires a substantially increased computational capacity in comparison to block averaging; and, therefore, block averaging, although not as highly selective as low pass filtering, may be preferred in image enhancing applications where reduced computational capacity is desired. Low pass filtering and block averaging are both well-known techniques in the electronic arts and therefore need not be described in any further detail herein.

The average value for the image defining luminance electronic information signal (Av) is thereafter provided to a gamma determining circuit 14 which determines gamma as a function of the average value input thereto in accordance with the following relationship:

$$\gamma=(1+C)(Av/M-1)$$

In the above relationship M for this example is selected to be the center value of the dynamic range of the electronic information signals. As was previously stated, the electronic signal values for this example comprise 8-bit binary numbers having a dynamic range of 256. Thus, for this example, M=128. However, it will be readily understood that M may be selected to be any value within the dynamic range of the electronic information signals depending upon where the least image enhancement is desired. Thus, for the case where M is selected to be at the center of the dynamic range, image enhancement will have the greatest effect near the ends of the dynamic range and the least effect toward the center of the dynamic range. Selecting the value of M to be closer to the high end of the dynamic range will decrease the effective image enhancement provided at that end by the system and method of this invention.

C is a control parameter selected in the manner of this invention to vary the amount of image enhancement that may be provided by the system and method of this invention in a manner to be more fully described in the following discussion.

The value of gamma is thereafter directed to a transfer function imposing circuit 16 which operates to impose the following transfer function on the image defining luminance electronic information signals (Y) received at input terminal Y_{input} and corresponding to each one of the succeeding pixels which collectively define the recorded image.

$$Y_{out}=Y_{MAX}(Y_{in}/Y_{MAX})^{\gamma}$$

Y_{MAX} equals the highest value of the dynamic range for the electronic information signals or 255 for the example herein described. Y_{out} equals the image defining

luminance electronic information signal transformed in the manner of this invention to provide an enhanced image. As is now readily apparent, it is selected for the image defining luminance electronic information signal for each pixel as a function of a local average of image defining luminance electronic information signals for a select group or plurality of pixels closely spaced about the pixel value being enhanced or transformed. Thus, gamma γ changes continuously in correspondence with the average values from the continuous stream of succeeding image defining luminance electronic information signals so that each image defining luminance electronic information signal is enhanced or transformed by a selected one of a plurality of different transfer functions.

Referring now to FIG. 2, there is shown a graphical representation of the various transfer functions that are imposed by the transfer function circuit 16 as a function of the variation in gamma γ. For the example as shown in FIG. 2, the control parameter C is selected to equal 1 and thus it can be seen that gamma γ has a variation of from 0.5 to 2. For instance, in the situation where the average value of the image defining luminance electronic signals is high and approaches the maximum value of the dynamic range which in this example equals 255 and is indicative of a portion of the image that is extremely bright, it can be seen that gamma γ equals 1+C or as in the case where C=1, gamma γ=2 as shown in the diagram of FIG. 2. The slope of the transfer function as is readily apparent for the situation where gamma γ=2 becomes quite steep at the high end of the dynamic range (B_{in}, B_{out}) thereby providing a higher contrast to those image defining luminance electronic information signals corresponding to pixels having the highest scene light intensity levels. The slope of the transfer function for γ=2 decreases significantly at the low end of the dynamic range (A_{in}, A_{out}) thereby providing a lower contrast to those image defining luminance electronic information signals corresponding to pixels having the lowest scene light intensity levels. Since M is selected to be at the center of the dynamic range, it can be seen that the slope of the transfer function at the center of the dynamic range most closely approximates that of a straight line thereby providing the least effect on the output signal for pixels having intensity levels near the center of the dynamic range.

Conversely, in the situation where the average values of the image defining luminance electronic information signals are low approaching 0 indicative of localized areas of low scene light intensity levels, then gamma γ=1 divided by 1+C which equals 0.5 in the case where C=1. The transfer function imposed by the transfer function circuit 16 in the case where gamma γ equals 0.5 is shown graphically in FIG. 2 as comprising a substantially steep slope in the areas (A_{in}, A_{out}) where the image defining luminance electronic information signal values are low. Thus, the transfer function in this case where gamma γ equals 0.5 operates to transform the image defining luminance electronic information signals to provide a high contrast to those electronic information signals corresponding to pixels having the lowest scene light intensity levels. The slope of the transfer function for γ=0.5 decreases significantly at the high end of the dynamic range (B_{in}, B_{out}) thereby providing a lower contrast to those image defining luminance electronic information signals corresponding to pixels having the highest scene light intensity levels. Again, since M is selected to be at the center of the dynamic range, it can be seen that the slope of the transfer function at the center of the dynamic range most closely approximates that of a straight line thereby providing the least effect on the output signal for pixels having intensity levels near the center of the dynamic range. It can be seen that the transfer function imposed by the transfer function circuit 16 can have any intermediate number of transfer functions shown between the extreme end transfer functions where gamma equals 0.5 or 2.0 and that all of the transfer functions are operative for the full extent of the input dynamic range so as not to clip the input signal values.

In the situation where the average value for the image defining luminance electronic information signal values corresponds to the intermediate value of the dynamic range, gamma γ=1 and the transfer function becomes a straight line to provide a one-to-one relationship between the input and output electronic information signals with no localized increase in contrast as provided by the other transfer functions where gamma γ is either greater or less than 1. Thus, in this manner in a situation where a scene may have localized dark or bright areas, there may be provided a localized increase in the contrast to those areas to make visible details that otherwise would be lost. The transfer functions vary in correspondence with the variation in the local average scene light intensity levels so as to apply the increased contrast selectively to those light or dark portions of the scene where details are otherwise obscured.

Referring now to FIG. 3, there is shown a graphical representation of the variation in gamma γ as a function of the variation of the control parameter C. Thus, it can be seen that for a control parameter C value of 1 gamma γ varies from 0.5 to 2. If the control parameter C is selected to be 0, gamma γ remains constant at 1. Although for a typical imaging application which requires dynamic range compression, it may be satisfactory to select the control parameter C to equal 1 thereby achieving an extreme variation in gamma from 2 to 0.5, it may be desirable to increase the amount of localized contrast thereby selecting values of the control parameter C greater than 1.

Referring now to FIG. 4 where like numerals reference previously discussed components, there is shown a circuit diagram for implementing a transfer function as described in connection with FIG. 1. The aforementioned transfer function may be converted to the following relationship by taking the logarithm on both sides of the aforementioned equation.

$$\log Y_{out} = \log Y_{MAX} + \gamma(\log Y_{in} - \log Y_{MAX})$$

Similarly, the relationship for determining gamma can also be rewritten as follows:

$$\log \gamma = (Av/M-1)[\log(1+C)]$$

These relationships can be implemented as shown by the circuit of FIG. 4. The average value of the image defining luminance electronic information signal is first directed to a multiplier circuit 18 where the signal is multiplied by 1/M where M equals one-half the dynamic range of the electronic information signals as previously discussed. The output from the multiplier circuit 18, in turn, is directed to a combining circuit 20 which operates to add a negative 1 to the output from the multiplier circuit 18. The control parameter C is directed to a combiner circuit 22 which operates to add

a positive 1 thereto. The output from the combiner circuit 22, in turn, is directed to a log circuit 24 which provides the logarithmic value for the C+1 input thereto. The output from the logarithmic circuit 24, in turn, is multiplied by the output from the combining circuit 20 by a multiplier circuit 26. The output from the multiplier circuit 26, in turn, is directed to an antilogarithmic determining circuit 28 which operates utilizing a lookup table to provide the antilogarithm creating the value of gamma γ.

The image defining luminance electronic information signal for each pixel, in turn, is directed to a logarithm determining circuit 30 in the transfer function circuit 16. The output from the logarithm determining circuit 30, in turn, is directed to a combiner circuit 32 which operates to subtract therefrom the logarithm for the maximum dynamic range of the electronic information signals. The output from the combiner 32, in turn, is multiplied by multiplier circuit 34 by the value of gamma γ received from the antilogarithm determining circuit 28. The output from the multiplier 34, in turn, is directed to a combiner circuit 36 for addition to the logarithm of the maximum dynamic range of the electronic information signals. The output from the combiner circuit 36, in turn, is directed to an antilogarithm determining circuit 38 to provide the transformed image defining luminance electronic information signals Y_{out} as shown. Thus, in this manner, gamma γ is determined continuously in accordance with the relationship as shown by the block diagram of FIG. 1 in a simple and convenient manner utilizing multiplication circuits, combining circuits, logarithm determining circuits, and antilogarithm determining circuits as shown in FIG. 4. In like manner, the transfer function continuously varied in accordance with the selection of gamma may also be imposed continuously in a simple and convenient manner by circuitry comprising a logarithm determining circuit, combining circuits, multiplication circuit, and an antilogarithm determining circuit. Thus, in this manner localized dynamic contrast enhancement can be provided as a function of dynamic gamma transformation on a pixel-by-pixel basis.

Thus, the system and method of this invention provides for enhancing electronic image data in a manner involving a relatively small number of computations that can be easily calculated in a continuous manner. All of the transfer functions that can be invoked are of a continuous nature without any sharp discontinuities that could otherwise result in undesirable artifacts appearing in the final image. In addition, as previously mentioned, none of the transfer functions operate to clip any portion of the incoming electronic information signal, thus resulting in the entire dynamic range of the incoming signal being transformed.

Other embodiments of the invention including additions, subtractions, deletions and other modifications of the preferred disclosed embodiments of the invention will be obvious to those skilled in the art and are within the scope of the following claims.

What is claimed is:

1. A system for continuously enhancing electronic image data received in a continuous stream of electronic information signals, each signal having a value within a determinate dynamic range of values and corresponding to one of a plurality of succeeding pixels which collectively define an image, said system comprising:

means for averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged; and

means for selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal.

2. The system of claim 1 wherein said selecting and transforming means is responsive to an average electronic information signal indicative of low scene light intensity levels for transforming the electronic information signals to provide a higher contrast to those electronic information signals corresponding to pixels having the lowest scene light intensity levels and is further responsive to an average electronic information signal indicative of high scene light intensity levels for transforming the electronic information signals to provide a higher contrast to those electronic information signals corresponding to pixels having the highest scene light intensity levels.

3. The system of claim 2 wherein said selecting and transforming means further operates to select said transfer function as a function of a determined constant whose value corresponds to the amount of contrast provided in those areas of higher contrast provided by said select transfer function.

4. The system of claim 3 wherein said selecting and transforming means further operates to determine the select transfer function as a function of the determination of gamma (γ), said selecting and transforming means including means for determining gamma (γ) in accordance with the relationship

$$\gamma=(1+C)(Av/M-1)$$

where C equals said determined constant, Av equals the average electronic information signal value and M equals a select proportionate value of the dynamic range of the electronic information signals.

5. The system of claim 4 wherein said transforming means transforms the electronic information signal of each pixel in accordance with the relationship

$$Y_{out}=Y_{MAX}(Y_{in}/Y_{MAX})^{\gamma}$$

where Y_{in} equals the value of the electronic information signal of the pixel to be enhanced, Y_{out} equals the enhanced value of the input electronic information signal and Y_{MAX} equals the highest value of the dynamic range for the electronic information signals.

6. A system for enhancing electronic image data received in a continuous stream of electronic information signals each signal having a value within a determinate dynamic range of values and corresponding to one of a

plurality of succeeding pixels which collectively define an image, said system comprising:

means for averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged;

means for dividing each of the average electronic information signals corresponding to each pixel by a value M corresponding to a select proportionate value of the dynamic range of said electronic information signals;

first means for subtracting 1 from each of the electronic information signals output by said dividing means;

first means for adding a select control parameter and 1;

first means for determining the logarithm of the output from said first adding means;

first means for multiplying the output from said first logarithm determining means by the output from said first subtracting means;

first means for determining the antilogarithm of the output from said first multiplying means;

second means for determining the logarithm for each of the continuous streams of electronic information signals;

second means for subtracting the logarithm for a value corresponding to the maximum value of the electronic information signals from the output of said second logarithm determining means;

second means for multiplying the output of said first antilogarithm determining means by the output from said second subtracting means;

second means for adding the logarithm of the value corresponding to the maximum value of the electronic information signals to the output from said second multiplying means; and

second means for determining the antilogarithm of the output from said second adding means to provide an enhanced output signal value.

7. A method for continuously enhancing electronic image data received in a continuous stream of electronic information signals each signal having a value within a determinate dynamic range of values and corresponding to one of a plurality of succeeding pixels which collectively define an image, said method comprising the steps of:

averaging the electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels;

selecting one of a plurality of different transfer functions for the electronic information signal for each of the plurality of succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel; and

transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said transfer function is selected further as a function of the ratio of the value of the average electronic information signal to a select proportionate value of the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal.

8. The method claim 7 wherein the transfer function is selected: in response to an average electronic information signal indicative of low scene light intensity levels to provide a higher contrast to those electronic information signals corresponding to pixels having the lowest scene light intensity levels and in response to an average electronic information signal indicative of high scene light intensity levels to provide a higher contrast to those electronic information signals corresponding to pixels having the highest scene light intensity levels.

9. The method of claim 8 wherein said transfer function is selected further as a function of a determined constant wherein increasing the value of said constant operates to increase the contrast in those areas of higher contrast provided by said select transfer function.

10. The method of claim 9 wherein said transfer function is selected as a function of the determination of gamma (γ) and gamma (γ) is determined for each pixel in accordance with the relationship

$$\gamma=(1+C)(Av/M-1)$$

where C equals said determined constant, Av equals the average electronic information signal value and M equals said value for one-half the dynamic range of the electronic information signals.

11. The method of claim 10 wherein said select transfer function for the electronic information signal of each pixel comprises the relationship

$$Y_{out}=Y_{MAX}(Y_{in}/Y_{MAX})^{\gamma}$$

where Y_{in} equals the value of the electronic information signal of the pixel to be enhanced, Y_{out} equals the enhanced value of the input electronic information signal and Y_{MAX} equals the highest value of the dynamic range for the electronic information signals.

12. A method for enhancing electronic image data received in a continuous stream of electronic information signals each signal corresponding to one of a plurality of succeeding pixels which collectively define an image, said method comprising the steps of:

averaging the electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels;

dividing each of the average electronic information signals corresponding to each pixel by a value M corresponding to a select proportionate value of the dynamic range of said electronic information signals;

subtracting 1 from each of the electronic information signals previously divided by the value M to provide a first intermediate signal value;

selecting a control parameter C as a function of the amount of image enhancement to be applied;

adding 1 to the control parameter C;

determining the logarithm of the control parameter C plus 1;

multiplying the logarithm of the control parameter C plus 1 by said first intermediate signal value to provide a second intermediate signal value;

determining the antilogarithm of the second intermediate signal value;

determining the logarithm for each of the continuous streams of electronic information signals;

subtracting from the previously determined logarithm for each of the continuous streams of electronic information signals the logarithm for a value corresponding to the maximum value of the electronic information signals to provide a third intermediate signal value;

multiplying the antilogarithm of the second intermediate signal value by the third intermediate signal value to provide a fourth intermediate signal value;

adding the logarithm of the value corresponding to the maximum value of the electronic information signals to the fourth intermediate signal value to provide a fifth intermediate signal value; and

determining the antilogarithm of the fifth intermediate signal value to provide an enhanced output signal value.

13. The method of claim 12 wherein said image enhancement operates to increase image contrast locally in areas of pixels having low contrast and said control parameter C is determined as a function of the amount of local contrast variation to be provided.

* * * * *

06-738

JS 44
(Rev. 12/96)

CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herin neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS

POLAROID CORPORATION

(b) COUNTY OF RESIDENCE OF FIRST LISTED PLAINTIFF _____
(EXCEPT IN U.S. PLAINTIFF CASES)

DEFENDANTS

HEWLETT-PACKARD COMPANY

COUNTY OF RESIDENCE OF FIRST LISTED DEFENDANT _____
(IN U.S. PLAINTIFF CASES ONLY)
NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE TRACT OF LAND INVOLVED.

2006 DEC 5 PM 2:39
U.S. DISTRICT COURT DISTRICT OF DELAWARE

(c) ATTORNEYS (FIRM ADDRESS AND TELEPHONE NUMBER)
Jack B. Blumenfeld (#1014)
Morris, Nichols, Arsht & Tunnell LLP
1201 N. Market Street
P.O. Box 1347
Wilmington, DE 19801
302-658-9200

ATTORNEYS (IF KNOWN)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (For Diversity Cases Only)

(PLACE AN "X" IN ONE BOX FOR PLAINTIFF AND ONE BOX FOR DEFENDANT)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated or Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated and Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. ORIGIN (PLACE AN "X" IN ONE BOX ONLY)

☒ 1 Original Proceeding | ☐ 2 Removed From State Court | ☐ 3 Remanded From Appellate Court | ☐ 4 Reinstated or Reopened | ☐ 5 Transferred From another district (specify) ____ | ☐ 6 Multidistrict Litigation | ☐ 7 Appeal to District Judge from Magistrate Judgement

V. NATURE OF SUIT (PLACE AN "X" IN ONE BOX ONLY)

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgement
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loans (Excl Veterans)
- ☐ 153 Recovery of Overpayment of Veteran's Benefits
- ☐ 160 Stockholder Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault Libel & Slander
- ☐ 330 Federal Employers Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury - Med Malpractice
- ☐ 365 Personal Injury - Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEAS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 R R & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 730 Labor Mgmt. Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ret Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant
- ☐ 871 IRS - Third Party 26 USC 7609

OTHER STATUTES
- ☐ 400 State Reapportionment
- ☐ 410 Antitrust
- ☐ 430 Banks or Banking
- ☐ 450 Commerce/ICC Rates/etc
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced and Corrupt Organizations
- ☐ 810 Selective Service
- ☐ 850 Securities/Commodities/ Exchange
- ☐ 875 Customer Challenge 12 USC 3410
- ☐ 891 Agricultural Acts
- ☐ 892 Economic Stabilization Act
- ☐ 893 Environmental Matters
- ☐ 894 Energy Allocation Act
- ☐ 895 Freedom of Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

VI. CAUSE OF ACTION (CITE THE U.S. CIVIL STATUTE UNDER WHICH YOU ARE FILING AND WRITE BRIEF STATEMENT OF CAUSE DO NOT CITE JURISDICTIONAL STATUTES UNLESS DIVERSITY)

Patent infringement under 35 U.S.C. § 271

VII. REQUESTED IN COMPLAINT

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23

DEMAND $

CHECK YES only if demanded in complaint:
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See Instructions)

IF ANY _____ JUDGE _____ DOCKET NUMBER _____

DATE December 5, 2006

SIGNATURE OF ATTORNEY OF RECORD

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP _____ JUDGE _____ MAG. JUDGE _____

AO FORM 85 RECEIPT (REV. 9/04)

United States District Court for the District of Delaware

Civil Action No. 06-738

ACKNOWLEDGMENT OF RECEIPT FOR AO FORM 85

NOTICE OF AVAILABILITY OF A UNITED STATES MAGISTRATE JUDGE TO EXERCISE JURISDICTION

2006 DEC -5 PM 2:45

FILED
U.S. DISTRICT COURT
DISTRICT OF DELAWARE

I HEREBY ACKNOWLEDGE RECEIPT OF 2 COPIES OF AO FORM 85.

12-5-06
(Date forms issued)

(Signature of Party or their Representative)

Aaron Johnston
(Printed name of Party or their Representative)

Note: Completed receipt will be filed in the Civil Action

TAB B

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION, Plaintiff, v. HEWLETT-PACKARD COMPANY, Defendant.	C.A. No. 06-738 (SLR)

ANSWER AND COUNTERCLAIMS

Defendant, Hewlett-Packard Company ("HP"), by its attorneys Fish & Richardson P.C., hereby responds to the Complaint of Plaintiff Polaroid Corporation ("Polaroid"). HP denies each and every allegation contained in the Complaint that is not expressly admitted below.

1. HP is without information or knowledge sufficient to form a belief as to the truth or falsity of the allegations of paragraph 1 and therefore denies such allegations.

2. HP admits that it is a Delaware Corporation with a principal place of business at 3000 Hanover Street, Palo Alto, California, 94304 and that it has used the marketing terms "Adaptive Lighting Technology" and "Digital Flash" in connection with certain products, and that it imports and sells certain consumables and software, but otherwise denies the allegations of paragraph 2.

3. HP is without information or knowledge sufficient to form a belief as to the truth or falsity of the allegations of paragraph 3 and therefore denies such allegations.

4. HP admits the allegations of paragraph 4.

5. HP admits the allegations of paragraph 5.

6. HP incorporates by reference, as if set forth in full herein, its answers to paragraphs 1-5 above.

7. HP admits that a document purporting to be U.S. Patent No. 4,829,381 ("the '381 patent") was attached to the Complaint as Exhibit A, purports to be entitled "System and Method for Electronic Image Enhancement by Dynamic Pixel Transformation," and purports to be issued May 9, 1989. HP is without information or knowledge sufficient to form a belief as to the truth or falsity of the remaining allegations of paragraph 7, and therefore denies the same.

8. HP admits that Exhibit A, on its face, lists Woo-Jin Song and Donald S. Levinstone as inventors of the '381 patent, and that the '381 patent, on its face, states that Polaroid is the assignee. HP is without information or knowledge sufficient to form a belief as to the truth or falsity of the remaining allegations of paragraph 8, and therefore denies the same.

9. HP admits only that "Adaptive Lighting Technology" is a marketing term that has been used in connection with certain HP products, and denies the remainder of paragraph 9.

10. HP admits only that "Adaptive Lighting Technology" is a marketing term that has been used in connection with certain HP products, and denies the remainder of paragraph 9.

11. HP denies the allegations of paragraph 11.

12. HP denies the allegations of paragraph 12.

13. HP admits paragraph 13 only to the extent that HP was in license negotiations with Polaroid in 2002 and 2003 and otherwise is without information or knowledge sufficient to form a belief as to the truth or falsity of the allegations of paragraph 13, and therefore denies such allegations.

14. HP is without information or knowledge sufficient to form a belief as to the truth or falsity of the allegations of paragraph 14, and therefore denies the same.

15. HP admits only that Polaroid offered to license the '381 patent in or about March of 2003 and otherwise denies the remainder of the allegations of paragraph 15.

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16. HP admits that it has not entered into a written license agreement with Polaroid regarding the '381 patent. HP denies the remaining allegations of paragraph 16.

17. HP denies the allegations of paragraph 17.

18. HP denies the allegations of paragraph 18.

19. HP denies the allegations of paragraph 19.

AFFIRMATIVE DEFENSES

First Affirmative Defense

20. HP products do not infringe and have not infringed any claims of the patent-in-suit.

Second Affirmative Defense

21. The claims in the patent-in-suit are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code, including, inter alia, §§ 101, 102, 103, and 112.

Third Affirmative Defense

22. Polaroid's claims are barred under the doctrine of laches, equitable estoppel, implied license, and/or license.

Fourth Affirmative Defense

23. Polaroid's claims for damages are limited by 35 U.S.C. § 287(a).

Fifth Affirmative Defense

24. Polaroid's conduct precludes an award of injunctive relief.

Sixth Affirmative Defense

25. Polaroid's claims are limited by the doctrine of prosecution history estoppel.

Seventh Affirmative Defense

26. Hewlett-Packard reserves the right to assert additional defenses that may become known to it through discovery, including but not limited to inequitable conduct.

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COUNTERCLAIMS

Defendant HP asserts the following counterclaims against Plaintiff Polaroid.

Parties

1. Counterclaim Plaintiff HP is a Delaware corporation having a principal place of business at 3000 Hanover Street, Palo Alto, California 94304.

2. Upon information and belief, Counterclaim Defendant Polaroid is a Delaware corporation having a principal place of business at 1265 Main Street – Building W3, Waltham, MA 02451.

Jurisdiction and Venue

3. These counterclaims arise under the Patent Law of the United States, as enacted under Title 35 of the United States Code, and the provisions of the Federal Declaratory Judgment Act, as enacted under Title 28 of the United States Code. The jurisdiction of the Court is proper under 35 U.S.C. § 271 et seq. and 28 U.S.C. §§ 1331, 1338, and 2201-2202.

4. This Court has personal jurisdiction over Polaroid because Polaroid is a resident of Delaware, having incorporated in this state. In addition, Polaroid has sufficient contacts with Delaware such that compelling it to appear and defend in the forum does not offend traditional notions of fair play and substantial justice.

5. In its Complaint, Polaroid alleges that HP infringes U.S. Patent No. 4,829,381 ("the '381 patent").

6. Because HP denies that it infringes any valid claim of the '381 patent, an actual and justiciable controversy has arisen and now exists between HP and Polaroid as to whether HP infringes any of the claims of the '381 patent and as to whether the '381 patents is invalid.

7. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1391 and 1400.

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Count I: Declaratory Relief Regarding Non-Infringement

8. The allegations of paragraphs 1-7 above are incorporated herein by reference.

9. HP does not infringe and has not infringed any claims of the patent-in-suit.

Count II: Declaratory Relief Regarding Invalidity

10. The allegations of paragraphs 1-7 above are incorporated herein by reference.

11. The claims in the patent-in-suit are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code, including 35 U.S.C. § 101.

12. The claims in the patent-in-suit are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code, including 35 U.S.C. § 102.

13. The claims in the patent-in-suit are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code, including 35 U.S.C. § 103.

14. The claims in the patent-in-suit are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code, including 35 U.S.C. § 112.

Requested Relief

HP respectfully requests a judgment against Polaroid as follows:

a. A declaration that HP does not infringe and has not infringed the patent-in-suit;

b. A declaration that United States Patent No. 4,829,381 is invalid;

c. That Polaroid take nothing by its complaint;

d. That the Court enter judgment against Polaroid and in favor of HP and that Polaroid's complaint be dismissed with prejudice;

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e. That the Court enter judgment that this case is an exceptional case under 35 U.S.C. § 285, and enter a judgment awarding HP its costs and reasonable attorneys' fees; and

f. That the Court grant HP whatever further relief the Court deems just and proper.

Demand for Jury Trial

HP hereby demands a jury trial on all claims and issues triable of right by a jury.

Dated: January 30, 2007

FISH & RICHARDSON P.C.

By: */s/ William J. Marsden, Jr.*

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Attorneys for Defendant
Hewlett-Packard Company

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CERTIFICATE OF SERVICE

I hereby certify that on January 30, 2007, I electronically filed with the Clerk of Court the foregoing Answer and Counterclaims using CM/ECF which will send electronic notification of such filing(s) to the following Delaware counsel. In addition, the filing will also be sent via hand delivery:

Jack B. Blumenfeld, Esq.
Julia Heaney, Esq.
Morris, Nichols, Arsht & Tunnell
1201 North Market Street
Wilmington, DE 19899-1347

Attorneys for Plaintiff
Polaroid Corporation

I hereby certify that on January 30, 2007, I have mailed by United States Postal Service, the document(s) to the following non-registered participants:

Russell E. Levine
Graham C. Gerst
Michelle W. Jordan
Kirkland & Ellis
200 East Randolph Drive
Chicago, IL 60601

Attorneys for Plaintiff
Polaroid Corporation

/s/ William J. Marsden, Jr.
William J. Marsden, Jr. (#2247)

80041514.doc

TAB C

REDACTED

TAB D

REDACTED

TAB E

REDACTED

TAB F

REDACTED

TAB G

REDACTED

TAB H

REDACTED

TAB I

REDACTED

TAB J

REDACTED

TAB K

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION, Plaintiff and Counterclaim-Defendant, v. HEWLETT-PACKARD COMPANY, Defendant and Counterclaim-Plaintiff.	C.A. No. 06-738 (SLR)

HEWLETT-PACKARD COMPANY'S FIRST SET OF INTERROGATORIES TO POLAROID CORPORATION

Pursuant to Rule 33 of the Federal Rules of Civil Procedure, Defendant and Counterclaim-Plaintiff Hewlett-Packard Company ("HP") hereby requests that Plaintiff and Counterclaim-Defendant Polaroid Corporation ("Polaroid") answer in writing the following interrogatories within thirty (30) days after service of these interrogatories.

These requests are continuing and impose on the responding party the obligations set forth in Rule 26(e) of the Federal Rules of Civil Procedure.

DEFINITIONS AND INSTRUCTIONS

As used in these Interrogatories, the following terms have the meaning indicated:

A. "HP" means Hewlett-Packard Company and its predecessors including its officers, directors, employees, agents and attorneys and subsidiaries and/or divisions.

B. "Polaroid," "plaintiff," "you," or "your" refers to Polaroid Corporation, including its past and present members, principals, management, directors, employees, agents, consultants, attorneys and others acting or purporting to act on plaintiff's behalf, and including the predecessor(s) in interest to the patent-in-suit, its subsidiaries, parents,

and affiliates. "Polaroid" includes any individual or entity that controls or controlled Polaroid, whether the control is or was total or just part, and includes, but is not limited to the Petters Group Worldwide.

C. The "381 patent" means U.S. Patent No. 4,829,381 and the patent applications from which it issued, namely U.S. Patent Application No. 07/182,987, filed April 18, 1988.

D. "Patent-in-suit" means the '381 patent, and any other Polaroid patents which are added as a basis for infringement to this action in any amended pleading or complaint.

E. "Related patents and/or applications" means any United States or foreign patent or patent application that discloses, in whole or in part, the subject matter disclosed in the patent-in-suit (including, without limitation, continuations, continuations-in-part, divisions, reissues, reexaminations, substitutes, and foreign counterparts), and also means all patents and patent applications cited in the specifications of the '381 patent.

F. The term "date" means the exact day, month, and year, to the extent known or, if unknown, Polaroid's best approximation thereof.

G. The term "communication" means any transmission of information.

H. The word "document" is used in its broadest sense to include everything that is contemplated by Rules 26 and 34 of the Federal Rules of Civil Procedure, including without limitation documents stored in electronic form, such as electronic mail, computer source code, object code and microcode, and documents stored on any media accessible by electronic means. A comment or notation appearing on any document that is not part of the original text is to be considered a separate "document."

I. "Thing" means any tangible object other than a document.

J. "Person" or "entity" includes not only natural persons, but also, without limitation, firms, partnerships, associations, corporations, and other legal entities, and divisions, departments, or other units thereof.

K. "Infringement" refers to any form of infringement actionable under United States law, including without limitation, direct infringement, contributory infringement, inducement to infringe, literal infringement, and infringement under the doctrine of equivalents.

L. "Prior art" means all categories of prior art that may be applied under 35 U.S.C. §§ 102-103.

M. "Alleged invention" means any invention Polaroid contends is disclosed, described, or claimed in the patent-in-suit.

N. "Relates to," "relating to" and "related to" mean describing, discussing, evidencing, concerning, reflecting, comprising, illustrating, containing, embodying, constituting, analyzing, stating, identifying, referring to, dealing with, or in any way pertaining to.

O. Whenever in these interrogatories there is a request to "identify" a document or to provide the identity of a document, please set forth: (1) the identity of the person(s) who drafted the document; (2) the identity of the person(s) who received (as addressee, "cc," "bcc," or otherwise) or approved the document or a copy thereof; (3) the date of the document; (4) the present location of the document; (5) the present custodian of the document; (6) the type of the document (e.g., letter, memorandum, tape recording, or other form of document); (7) a description of the document with the specificity

required to allow it to be requested by a subpoena or a request for production of documents, and (8) the document production number, if the document has been produced by either side or a third party.

P. Whenever in these interrogatories there is a request to "identify" a communication, please set forth: (1) the date and place of such communication; (2) the identity of each person who was present at, involved in, connected with or who participated in such communication; (3) the type of communication (e.g., letter, e-mail, telegram, conference, meeting, telephone conversation); (4) the substance of such communication; and (5) each document reflecting or comprising such communication.

Q. Whenever in these interrogatories there is a request to "identify" a source of information, please identify: (1) the person from whom the answering party obtained the information; and (2) each communication from such person constituting, summarizing, reflecting, or referring to the information.

R. Whenever in these interrogatories there is a request to "identify" or to "set forth the identity" of an individual, the answering party shall state with respect to such individual: (1) his name; (2) his present business or home address; (3) his business or home telephone number; (4) his present or last known employer and his present or last known position; and (5) all positions he has held with the answering party (including the dates each such period of employment commenced and terminated, and a brief description of the responsibility of such position).

S. "Polaroid Products" means products made by or on behalf of Polaroid, products made or on behalf of any of Polaroid's licensees, or sold by or on behalf of Polaroid.

T. "Image Enhancement" means any process of adjusting an image by manipulating the image data with software or other tools to 1) improve the perception of the image; 2) provide other types of improvement for viewing or automated image processing; or 3) compute one or more local or global averages within an image by any method, including the application of a low-pass filter to the image data, and compute (expressly or implicitly) a ratio where the numerator is a local or global average within an image and the denominator is a number that is either a select proportion of the dynamic range, the dynamic range, or determined from the dynamic range.

INSTRUCTIONS

1. The singular shall include the plural and vice versa, and the conjunctive shall include the disjunctive and vice versa, in order to give these interrogatories their broadest scope.

2. Your response to each interrogatory shall include such information as is within your custody, possession, or control, or within the custody, possession, or control of your attorneys, investigators, agents, employees or other representatives.

3. If any information is withheld on the grounds of a claim of attorney/client privilege, work product immunity, or some other privilege or immunity, then the answer shall provide sufficient details to enable the claim of privilege or immunity to be adjudicated, including:

i) The identity of each document's author(s), writer(s), sender(s), or initiator(s);

ii) The identity of each document's recipient(s), addressee(s), carbon copy recipient(s), or party(ies) for whom it was intended;

iii) The date of creation or transmittal indicated on each document, or an estimate of that date, indicated as such, if no date appears on the document;

iv) The general subject matter as described on each document, or, if no such description appears, then some other description sufficient to identify the document; and

v) The claimed ground(s) for limitation of discovery (e.g., "attorney-client privilege" or "work product privilege").

4. In the event Polaroid claims an interrogatory is overbroad, Polaroid shall respond to that portion of the request which it believes is unobjectionable and specifically identify the respect in which the request is allegedly overbroad. If Polaroid contends an interrogatory, definition, or instruction is vague or ambiguous, Polaroid should identify what language it considers ambiguous and state the interpretation it is using in responding.

5. If the procedure for answering interrogatories as authorized by Federal Rule of Civil Procedure 33(d) is used, for each interrogatory and subpart thereof, identify the specific document(s) responsive to the interrogatory.

6. If you or your attorney know of the existence, past or present, of a requested document but such document is not currently in your possession, custody, or control, or in the possession, custody, or control of your agents, representatives, or attorneys, identify the document and the individual in whose possession, custody, or control the document was last known to reside. For a document that no longer exists or that cannot be located, identify the document, state how and when it passed out of existence, or when it could no longer be located, and the reason for the disappearance.

Also identify each person having knowledge about the disposition or loss of the document, and identify any other document evidencing the lost document's existence or any facts about the lost document.

7. If, after exercising due diligence to secure the information requested, you cannot fully answer an interrogatory or any part thereof, please state the reasons for your inability to fully answer, answer the interrogatory to the fullest extent possible, and state what information, knowledge, or belief you have concerning the unanswered portion.

8. The following interrogatories are of a continuing nature and supplemental responses in accordance with Rule 26(e) of the Federal Rules of Civil Procedure are required.

INTERROGATORIES

INTERROGATORY NO. 1:

For each claim of the patent-in-suit which Polaroid alleges is infringed, identify such claim and each and every HP product that Polaroid accuses of infringement of such claim.

INTERROGATORY NO. 2:

For each and every product identified in response to Interrogatory No. 1, explain in detail in claim chart or other form Polaroid's infringement contention(s), including: under which theory or theories Polaroid is contending the accused product infringes (i.e., directly literally, directly under the doctrine of equivalents, indirectly and literally by contributing to infringement, indirectly and under the doctrine of equivalents by contributing to infringement, indirectly and literally by inducing infringement, and/or indirectly and under the doctrine of equivalents by inducing infringement); if alleging

direct infringement, how Polaroid contends each and every element of each asserted claim is satisfied by each of the accused products and/or how features of the accused HP products are equivalent under the doctrine of equivalents to each and every element of each asserted claim; if alleging indirect infringement, how Polaroid contends HP is contributing to and/or inducing infringement, the identity of all third parties Polaroid contends directly infringe such claims, how Polaroid contends each and every element of each asserted claim is satisfied by each of the third parties and/or how features of the third party products are equivalent under the doctrine of equivalents to each and every element of each asserted claim; and all facts, information, documents, and things that Polaroid alleges support such contention(s).

INTERROGATORY NO. 3:

For each claim of the patent-in-suit, describe fully the history, process, and circumstances leading to the alleged invention of each such claim, including: identifying the dates Polaroid contends that claim was conceived and first reduced to practice; describing the circumstances of such alleged conception, first reduction to practice, and any diligence there-between; identifying all persons involved in such alleged conception, diligence, and reduction to practice; and identifying all facts, information, documents, and things that Polaroid contends corroborates such alleged conception, diligence, and reduction to practice.

INTERROGATORY NO. 4:

If Polaroid contends the patent-in-suit is entitled to a priority date earlier than May 9, 1989, identify the earlier priority date(s) to which Polaroid contends it is entitled

and all witnesses, facts, information, documents, and things which support this contention.

INTERROGATORY NO. 5:

Identify how, when, and for what consideration you acquired the rights to the patent-in-suit and any related patents and/or applications.

INTERROGATORY NO. 6:

Identify each and every individual "associated with the filing and prosecution of" (as that phrase is used in 37 C.F.R. § 1.56) the patent-in-suit and any related patents and/or applications, and what that individual's role was with respect to filing and prosecution.

INTERROGATORY NO. 7:

From January 1, 1985 until the date their respective employments terminated at Polaroid, for each of the named inventors of the patent-in-suit, identify each of the specific projects and specific products that each inventor worked on by date worked, specific project and specific product name, model number, and internal Polaroid code-name, and all co-workers and managers on each project and product.

INTERROGATORY NO. 8:

Identify all prior art of which Polaroid is aware that concerns, discloses, describes, or claims any alleged invention, as well as the date when Polaroid became aware of each prior art reference.

INTERROGATORY NO. 9:

Identify any and all Polaroid Products that include or have included Image Enhancement, identifying the Image Enhancement process or product, whether the Image

Enhancement process or product embodies or embodied one or more of the claims of the patent-in-suit, and the specific claim or claims that are embodied by the product, if applicable.

INTERROGATORY NO. 10:

For each and every product identified in response to Interrogatory No. 9, identify the number of units sold, average selling price, gross profit, cost, and Polaroid's capacity or ability to produce the identified product(s) through April 18, 2008, and, if applicable, whether or not Polaroid marked the product with the patent-in-suit.

INTERROGATORY NO. 11:

If Polaroid or any other entity has asserted the patent-in-suit against any individual or entity other than HP, identify each of those entities and the status of the assertion, and for any assertions that have given rise to litigation, identify: the case number, title, and jurisdiction; Polaroid's counsel of record in the case; opposing counsel of record in the case; whether the case is ongoing; and, if the litigation has ended, the outcome of the litigation, including all jury verdicts, bench verdicts, settlement agreements, licenses, or other agreements.

INTERROGATORY NO. 12:

If Polaroid contends it is entitled to damages in this case, identify each theory or theories under which it contends it is entitled to damages (e.g., reasonably royalty, lost profits) and the amount of damages it contends it is entitled to under each theory, including all witnesses, facts, information, documents, and things which support each contention.

INTERROGATORY NO. 13:

Identify each person or entity that is a licensee, was a licensee, has been offered a license, has negotiated a license, or presently is negotiating a license to the patent-in-suit or any related patents and/or applications and the terms of any such licenses.

INTERROGATORY NO. 14:

Identify the date and circumstances surrounding when Polaroid first believed that HP's products infringed the patent-in-suit, and the basis for that belief.

INTERROGATORY NO. 15:

To the extent that Polaroid contends that HP willfully infringed the patent-in-suit, identify all witnesses, facts, information, documents, and things which support Polaroid's contention.

INTERROGATORY NO. 16:

If Polaroid contends that any standard industry royalty, royalty rate, or royalty base or any industry norm royalty, royalty rate, or royalty base, or any typical or usual royalty, royalty rate, or royalty base applies or relates to the patent-in-suit or any product Polaroid accuses of infringement, identify with specificity: any such royalty, royalty rate, or royalty base; the specific industry to which the royalty, royalty rate, or royalty base apply; the specific HP products to which the royalty, royalty rate, or royalty base apply; all evidence upon which Polaroid will rely to establish the royalty, royalty rate, or royalty base; all documents related to any such royalty, royalty rate, or royalty base; and the identity of any individuals with knowledge of any such royalty, royalty rate or royalty base.

INTERROGATORY NO. 17:

Identify each person or entity that now holds, or in the past has held, any interests or rights in the patent-in-suit including without limitation ownership interests (including undivided pro rata interests), security interests, license rights, covenants not to sue, or would receive any compensation, whether money or other consideration, should Polaroid succeed in its claim against HP or otherwise receive any payment from HP. For each identified person or entity, identify any documents or oral agreements related to such rights or interests by title, products or services involved and date of execution.

INTERROGATORY NO. 18:

If Polaroid contends it is entitled to any damages prior to the date it filed its complaint in this case, identify all facts and documents which relate to Polaroid's contention, and any legal theory supporting that contention.

INTERROGATORY NO. 19:

To the extent Polaroid is or was ever controlled by any other entity, either totally or in part, including but not limited to the Petters Group Worldwide, identify that entity, provide the circumstances under which that entity obtained control of Polaroid, including the consideration the entity paid for the control, and identify any documents related to the control, obtaining of control, or consideration for control.

Dated: May 22, 2007

FISH & RICHARDSON P.C.

By: */s/ Matthew C. Bernstein*

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Attorneys for Defendant and Counterclaim-Plaintiff Hewlett-Packard Company

CERTIFICATE OF SERVICE

I hereby certify that on May 22, 2007, I served a copy of the attached **HEWLETT-PACKARD COMPANY'S FIRST SET OF INTERROGATORIES TO POLAROID CORPORATION** on the following individuals in the manner indicated:

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TAB L

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TAB M

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TAB N

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TAB O

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION, Plaintiff and Counterclaim Defendant, v. HEWLETT-PACKARD COMPANY, Defendants and Counterclaim Plaintiff.	C.A. No. 06-738-SLR

HEWLETT-PACKARD COMPANY'S NOTICE OF AGREEMENT TO POLAROID'S PROPOSED CONSTRUCTION OF "AVERAGING" AND "AVERAGE"

In the parties' submissions regarding claim construction, Hewlett-Packard Company ("HP") proposed constructions for the terms "averaging" (in claims 1 and 7) and "average" (in claims 1,2, 7 and 8) of U.S. Patent No. 4,829,381 that differed from the constructions for those terms proposed by Polaroid Corporation ("Polaroid"). In the interest of reducing the number of disputed claim terms that the Court must resolve, HP hereby agrees to Polaroid's proposed constructions of the terms "averaging" and "average." For the convenience of the Court, attached hereto as Exhibit A are replacements for pages 3 and 4 of the Joint Claim Construction Chart (D.I. 90) to reflect that "HP agrees to Polaroid's construction" for each of these terms. Attached hereto at Exhibit B are redlined versions of these same pages to reflect the changes from the original filing.

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Attorneys for Defendant and Counterclaim-Plaintiff Hewlett-Packard Company

Dated: May 15, 2008

CERTIFICATE OF SERVICE

I hereby certify that on May 15, 2008, I electronically filed with the Clerk of Court the foregoing document using CM/ECF which will send electronic notification of such filing(s) to the following counsel:

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/s/ William J. Marsden, Jr.
William J. Marsden, Jr.

EXHIBIT A

Claim Term	Polaroid's Claim Construction	Hewlett-Packard's Claim Construction
	value within a determinate dynamic range of values" should be construed to mean "**each signal being associated with a value that lies within a range of possible values bounded by definite limits.**"	
means for averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged [Claim 1] This claim element is a means-plus-function element under 35 U.S.C. § 112, ¶ 6.	The **function** of this means-plus-function element is averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged. The terms used to describe the function should be construed as: *"averaging"* should be construed to mean "**calculating an intermediate value for.**" *"electronic information signals"* should be construed to mean "**signals providing pixel information, such as color, luminance, or chrominance values.**" *"average electronic information signal"* should be construed to mean "**signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value.**" The corresponding **structure** is a low pass filter or block average and equivalents thereof.	**Function:** providing an average for selected pixel values around one pixel, where the average is correlated to each pixel making up the average. **Disclosed Structure**: a block averager 12 with a buffer memory that takes luminance as an input and outputs an average luminance value that is correlated to each pixel in the block, and equivalents thereof.
averaging [Claims 1 and 7]	*"averaging"* should be construed to mean "**calculating an intermediate value for.**"	HP agrees to Polaroid's construction of "averaging"

Claim Term	Polaroid's Claim Construction	Hewlett-Packard's Claim Construction
average [Claims 1, 2, 7 and 8]	"*average*" should be construed to mean "**of calculated intermediate value.**"	**HP agrees to Polaroid's construction of "average"**
average electronic information signal [Claims 1, 2, 7 and 8]	*"average electronic information signal"* should be construed to mean "**signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value.**"	***No construction necessary.*** Alternatively: the average of the electronic information signals.
means for selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal [Claim 1]	The **function** of this means-plus-function element is selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal. The terms used to describe the function should be construed as: "*transfer function*" should be construed to mean "**function that transforms an input signal.**" *"electronic information signal"* should be construed to mean "**signal providing pixel information, such as a color, luminance, or**	**Function:** selecting a transfer function for each incoming pixel based on the pixel value and its corresponding average electronic information signal, and based on the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing the dynamic range of the average electronic information signals. **Disclosed Structure: none (*indefinite*),** alternatively: a gamma determining circuit 14 containing a multiplier circuit 18, a combining circuit 20, a second combiner circuit 22, a log circuit 24, a multiplier circuit 26 and a antilogarithmic determining circuit 28 – all arranged according to Fig 4, which computes gamma based on the formula $\gamma = (1+C)^{(A_v/M-1)}$, where A_v is average luminance of the input, C is a constant and M equals one half of the dynamic range. and the transfer function imposing circuit 16 containing a logarithm determining circuit 30, a combiner circuit 32, a multiplier circuit 34, a

EXHIBIT B

Claim Term	Polaroid's Claim Construction	Hewlett-Packard's Claim Construction
	value within a determinate dynamic range of values" should be construed to mean "**each signal being associated with a value that lies within a range of possible values bounded by definite limits**."	
means for averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged [Claim 1] This claim element is a means-plus-function element under 35 U.S.C. § 112, ¶ 6.	The **function** of this means-plus-function element is averaging electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged. The terms used to describe the function should be construed as: *"averaging"* should be construed to mean "**calculating an intermediate value for**." *"electronic information signals"* should be construed to mean "**signals providing pixel information, such as color, luminance, or chrominance values**." *"average electronic information signal"* should be construed to mean "**signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value**." The corresponding **structure** is a low pass filter or block average and equivalents thereof.	**Function:** providing an average for selected pixel values around one pixel, where the average is correlated to each pixel making up the average. **Disclosed Structure**: a block averager 12 with a buffer memory that takes luminance as an input and outputs an average luminance value that is correlated to each pixel in the block, and equivalents thereof.
averaging [Claims 1 and 7]	*"averaging"* should be construed to mean "**calculating an intermediate value for**."	~~**taking an arithmetic mean of**~~ ~~**or**~~ HP agrees to Polaroid's construction of "averaging"

Claim Term	Polaroid's Claim Construction	Hewlett-Packard's Claim Construction
average [Claims 1, 2, 7 and 8]	"*average*" should be construed to mean "**of calculated intermediate value.**"	~~**an arithmetic mean**~~**HP agrees to Polaroid's construction of "average"**
average electronic information signal [Claims 1, 2, 7 and 8]	"*average electronic information signal*" should be construed to mean "**signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value.**"	***No construction necessary.*** Alternatively: the average of the electronic information signals.
means for selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal [Claim 1]	The **function** of this means-plus-function element is selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal. The terms used to describe the function should be construed as: "*transfer function*" should be construed to mean "**function that transforms an input signal.**" "*electronic information signal*" should be construed to mean "**signal providing pixel information, such as a color, luminance, or**	**Function:** selecting a transfer function for each incoming pixel based on the pixel value and its corresponding average electronic information signal, and based on the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing the dynamic range of the average electronic information signals. **Disclosed Structure: none (*indefinite*),** alternatively: a gamma determining circuit 14 containing a multiplier circuit 18, a combining circuit 20, a second combiner circuit 22, a log circuit 24, a multiplier circuit 26 and a antilogarithmic determining circuit 28 – all arranged according to Fig 4, which computes gamma based on the formula $\gamma = (1+C)^{(A_v/M-1)}$, where A_v is average luminance of the input, C is a constant and M equals one half of the dynamic range. and the transfer function imposing circuit 16 containing a logarithm determining circuit 30, a combiner circuit 32, a multiplier circuit 34, a

TAB P

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CERTIFICATE OF SERVICE

I, the undersigned, hereby certify that on May 23, 2008, I electronically filed the foregoing with the Clerk of the Court using CM/ECF, which will send notification of such filing(s) to the following:

William J. Marsden, Jr.
FISH & RICHARDSON P.C.

I also certify that copies were caused to be served on May 23, 2008 upon the following in the manner indicated:

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